WE CLAIM:

1. A method for assigning metric information to an abstracted link of an abstracted network map, the method comprising:

receiving from each network element (NE) of an underlying network represented in the abstracted network map, at least resource availability information associated with available routes between the NE and other NEs represented in the abstracted network map, the available routes being computed using local resource availability information related to physical links between the NEs in the underlying network; and

transforming resource availability information associated with corresponding routes into metric information to be used by a client NE (CNE), respective metric information being associated with corresponding abstracted links that extend between two NEs that represent respective ends of the route.

2. The method as claimed in claim 1 wherein the receiving the available routes further comprises receiving a set of optimal routes that are optimized for resource availability by constructing a tree to span a graph of the data transport network, the tree rooted at a root node representing the NE and iteratively expanded so that paths from the root node to other nodes in the tree correspond to routes of optimal resource availability with respect to the local resource availability information.

3. The method as claimed in claim 2 wherein the routes are optimized first for a primary availability parameter, and second for a secondary availability parameter.

4. The method as claimed in claim 2 further comprising determining whether the resource availability information associated with an optimal route is relevant to an abstracted link in the abstracted network map, prior to the transforming, so that only if the optimal route is relevant to an abstracted link in the abstracted network map, is the resource availability information transformed.

5. The method as claimed in claim 2 wherein transforming comprises formulating a metric information update message to be sent to an edge client network element (CNE), the metric information update message including resource availability information in units and in a format expected by the CNE.

6. The method as claimed in claim 2 wherein transforming further comprises calculating a predefined fraction of the resource availability of the optimal route to associate with the metric information, in order to offer a percentage of the available bandwidth to the client network.

7. The method as claimed in claim 5 wherein the method is performed by an edge NE of the data transport network that is connected by a link to the CNE and is a member of the abstracted network map, and wherein the method further comprises:

monitoring physical links in the underlying network adjacent to the edge NE to identify changes to resource availability of local physical links, and exchanging resource availability information with other NEs of the underlying network, in order to maintain resource availability information for all physical links in the underlying network; and

using the resource availability information to compute optimal routes between the edge NE and the other NEs in the abstracted network map.

8. A method for computing metric information for an abstracted link of an abstracted network map, the method comprising:

maintaining resource availability information regarding respective physical links of an underlying network at a network element (NE) in the abstracted network map; and

using the resource availability information to construct a spanning tree rooted at a root node representing the NE, the tree being constructed by:

iteratively expanding the tree to include a node adjacent to a node in the tree when a path from the root to the adjacent node corresponds to a route of optimal resource availability over physical links between the NE and a second NE represented by the adjacent node, among all of the paths from the root node to nodes not in the tree.

9. The method as claimed in claim 8 wherein constructing the tree comprises constructing the tree so that each path in the tree from the root is optimized first for a primary resource availability parameter, and secondly for a secondary resource availability parameter.

10. The method as claimed in claim 8 further comprising transforming the resource availability information of the optimal paths between NEs of the abstracted network map into metric information for a related abstracted link, and forwarding the metric information to a client network.

11. The method as claimed in claim 8 further comprising:

receiving a change in resource availability information relating to a physical link;

determining if the changed resource availability information might change an optimal path between the root node and a node representing another NE in the abstracted network map, and if so, re-constructing the spanning tree using the changed resource availability information.

12. The method as claimed in claim 8 wherein constructing the spanning tree comprises:

updating temporary labels of all of the NEs adjacent to permanently labeled NEs of the spanning tree with labels that include a path, a cost of the path and a bandwidth availability associated with the path;

making permanent a temporary label having a highest bandwidth availability, and having a lowest cost among the labels with the highest bandwidth availability; and

repeating the updating and making permanent until all of the NEs in the data transport network are permanently labeled.

13. The method as claimed in claim 8 wherein maintaining resource availability information comprises:

monitoring resource availability of local physical links that are adjacent to the NE;

exchanging changes in the resource availability of physical links with the other NEs of the underlying network; and

storing current resource availability information relating to each physical link of the underlying network in a link state database.

14. A network element (NE) of a data transport network that is represented in an abstracted network map wherein the NE is interconnected to other NEs of the abstracted network map by respective abstracted links, the NE comprising:

memory for storing a link state database including resource availability information relating to physical links in the data transport network; and

a processor for constructing a spanning tree rooted at a root node representing the NE using the resource availability information, by:

iteratively expanding the tree from an instant node to include each node adjacent to the instant node in the tree when a path from the root node through the instant node to the node adjacent the instant node is a route of optimal resource availability with respect to physical links between the NE represented by the root node and a NE represented by the node adjacent to the instant node.

15. The NE as claimed in claim 14 wherein the processor iterative expands the tree by identifying a path that is optimized for both a primary availability parameter, and a secondary availability parameter.

16. The NE as claimed in claim 15 wherein the processor for constructing the spanning tree comprises modules for:

updating temporary labels of all nodes adjacent to a permanently labeled node of the spanning tree with labels that include a path, a cost of the path and a bandwidth availability associated with the path;

making permanent a temporary label having a highest bandwidth availability, and having a lowest cost among the labels with the highest bandwidth availability; and

repeating the updating and making permanent until all of the nodes representing NEs in the abstracted network map are permanently labeled.

17. The NE as claimed in claim 14 further comprising a network control signaling system for exchanging changes in resource availability information relating to physical links in the data transport network with the other NEs of the data transport network, and for exchanging the resource availability information of the optimal routes between NEs of the abstracted network map with other NEs in the abstracted network map.

18. The NE as claimed in claim 17 wherein the NE comprises:

an edge NE connected by a link to a client network element (CNE) that uses the abstracted network map;

program instructions for transforming the resource availability information into metric information of a related abstracted link; and

a network control signaling system adapted to send the metric information to the CNE.

19. The NE as claimed in claim 18 wherein the program instructions for transforming comprise modules for formulating a metric information update message to be sent to an edge client network element (CNE), the metric information update message including resource availability information in units and in a format expected by the CNE.

20. The NE as claimed in claim 19 wherein transforming further comprises calculating a predefined fraction of the resource availability of the optimal route to associate with the metric information, in order to

offer a percentage of the available bandwidth to the CNE.